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FAMILY LYCEUM.

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BIOGRAPHY.

ROGER BACON.

ROGER BACON, an English monk of the Franciscan order, celebrated for his genius, learning, and philosophy, was born near Ilchester, in Somersetshire, in the year 1241. He commenced his studies at Oxford, from whence he removed to the university of Paris, which, at that time, was esteemed the centre of literature; here he made such progress in the sciences, that he was esteemed the glory of the university, and was in high estimation with several of his countrymen, particularly with Robert Grosseteste, afterwards bishop of Lincoln, his great friend and patron.—Having taken the degree of doctor, he took the habit of the Franciscan order, either while he was in France, or soon after his return to England, about the year 1240. He now pursued his favorite study of experimental philosophy with unremitting ardor and assiduity. In this pursuit, in experiments, instruments, and in scarce books, he informs us he spent, in the course of twenty years, no less than £2000, which sum was generously furnished to him by some of the heads of the university, to enable him the better to pursue his noble researches. But such extraordinary talents, and progress in the sciences, which, in that ignorant age, were so little known to the rest of mankind, while they raised the admiration of the more intelligent, could not fail to excite the envy of his illiterate fraternity, whose malice he further drew upon him by the freedom with which he treated the clergy in his writings, in which he spared neither their ignorance, nor their want of morals. These, therefore, found no difficulty in possessing the vulgar with the notion of Bacon's dealing with the devil. Under this pretence, he was restrained from reading lectures; his writings were confined to his convent, and, at length, in 1278, he himself was imprisoned in his cell, at sixty-four years of age; being allowed, however, the use of his books, he still proceeded in the rational pursuit of knowledge, correcting his former labors, and writing several curious pieces. When Bacon had been ten years in confinement, Jerom de Ascoli, general of his order, who had condemned his doctrine, was chosen pope, by the name of Nicholas IV., and being reputed a person of great abilities, and one who had turned his thoughts to philosophical studies, Bacon resolved to apply to him for his discharge; and to show both the innocence and the usefulness of his studies, addressed to him a treatise, 'On the Means of avoiding the infirmities of old Age.' What effect this had on the pope, does not appear; it did not, at least, produce an immediate discharge; however, towards the latter end of his reign, by the interposition of some noblemen, Bacon obtained his liberty, after which, he spent the remainder of his life in the college of his order, where he died, in the year 1294, at eighty years of age, and was buried in the Franciscan church.—Such are the few particulars which the most diligent researches have been able to discover concerning the life of this extraordinary man. His numerous writings show the great genius and force of mind which he possessed. In his treatise 'Of the secret Works of Art and Nature,' he shows, that a person perfectly acquainted with the manner observed by nature in her operations, would be able to rival her. In another piece, 'Of the Nullity of Magic,' he points out, with great sagacity and penetration, whence the notion of it sprung, and how weak all pretences to it are. From a perusal of his work, it is evident, that Bacon was no stranger to many of the capital discoveries of the present and past ages. Gunpowder he certainly knew; thunder and lightning, he tells us, may be produced by art; for that sulphur, nitre, and charcoal, which, when separate, have no sensible effect, when mixed together, in due proportion, and closely confined, and fired, yield a loud report. A more precise description of gunpowder cannot be given in words. He also mentions a sort of unextinguishable fire, prepared by art, which proves that he was not unacquainted with phosphorus; and that he had a notion of the rarefaction of the air, and the structure of an air-pump, is past contradiction. He was the miracle, says Dr. Friend, of the age in which he lived, and the greatest genius, perhaps, for mechanical knowledge, that ever appeared in the world since Archimedes. He appears, likewise, to have been a master in the science of optics; he has accurately described the uses of reading-glasses, and shows the way of making them.—Dr. Friend adds, that he also describes the camera obscura, and all sorts of glasses which magnify or diminish any object, or bring it nearer to the eye, or remove it further off.—Bacon says himself, that there were none ever in use among the Latins, till his friend Peter de Maharn Curia applied himself to the making of them. That the telescope was not unknown to him, appears from a passage where he says, that he was able to form glasses in such a manner, with respect to our sight and the object, that the rays shall be refracted and reflected wherever we please, so that we may see a thing under whatever angle we thiuk proper, either near or at a distance, and be able to read the smallest letters at an incredible distance, and to count the dust and sand, on account of the greatness of the angle under which we see the objects; and, also, that we shall scarce see the greatest bodies near us, on account of the smallness of the angle under which we view them.—His skill in astronomy was amazing; he discovered that error which occasioned the reformation of the calendar, one of the greatest efforts, according to Dr. Jebb, of human industry; and his plan for correcting it was followed by pope Gregory XIII., with this variation, that Bacon would have had the correction to begin from the birth of our Saviour, whereas Gregory's amendment reaches no higher than the Nicene council.

Bishop Bale mentions more than eighty treatises written by this extraordinary man. Dr. Jebb, the editor of his Opus Majus, classes his writings under these heads: grammar, mathematics, physics, optics, geography, astronomy, chronology, chemistry, magic, medicine, logic, metaphysics, ethics, theology, philology, and miscellanies. It must, however, be confessed, that one and the same work by him has in other copies borne another title. His chemical tracts are in the Thesaurus Chemicus, printed at Frankfort, in 8vo., 1620. His treatise on avoiding the infirmities of old age, was printed at Oxford in 1590; and an English translation of it, by Dr. Richard Browne, appeared in 1683.—Several pieces yet remain in MS., particularly one on chronology, entituled Computus Rogeri Baconis; another, called Liber Naturalium, and the Compendium of Theology, all which are in the library which was collected by the late king; and has so generously been given to the public, by our magnanimous king, George IV.—[*Universal Biography.*

ALFRED.

ALFRED, or ÆLFRED, sirnamed the *Great*, the most illustrious of the Anglo-Saxon kings, was the youngest son of Ethelwolf, king of the West Saxons, and was born at Warmating, supposed to be Wantage in Berkshire, A. D. 849. So early as his fifth year, he was taken by his father to Rome, and he was again sent there, some time afterwards, with a numerous retinue. On his second visit he is said to have received the royal unction from the pope, Leo IV., on a report of his father's death, though it is certain he could not be regarded as the heir of the crown while he had three elder brothers. It may be supposed, that at this polished court he imbibed, though so young, that taste for civilized society, for which he was afterwards so much distinguished; yet it appears, that on his return, the indulgence of his parents suffered him to misspend his time in youthful sports, so that in his twelfth year he was not yet able to read. His mother first excited in him the desire of literary attainments by the recital of some Saxon poems, and when he had mastered those compositions, he proceeded to acquire a knowledge of the Latin language, and gained such a relish for study, that he was totally absorbed in these pursuits, till the state of the kingdom called him forth to active life.

His father died when he was only ten years old, and was succeeded by his sons Ethelbald and Ethelbert, in conjunction.—The former soon dying, left the latter sole king, who, after a reign of five years, died, and gave way to his next brother Ethelred. The condition of England was at this time most calamitous. The piratical Danes, continually pouring in fresh bands of plunderers, had laid waste a great part of the kingdom, and established themselves in several of the central districts. Alfred had no great cause to be satisfied with the justice or generosity of his brothers towards him, but philosophy had rendered him content with a small maintenance, in lieu of a large patrimony which his father had bequeathed him. On the summons of Ethelred, however, he quitted his beloved studies, and took up arms against the invaders. He fought along with his brother with various success, and when Etheired lost his life in consequence of a wound, Alfred, then twenty-two years of age, A. D. 871, ascended the throne of England, and was soon after anointed king at Winchester. Nothing but the distracted state of the kingdom could have induced him to accept the crown; nor was it till after repeated solicitations from the nobility and clergy, that he could be prevailed on to take the helm of government.

Since his twelfth year he had imbibed a taste for literature, which gave him a turn for that retirement necessary to the pursuit of knowledge; it was therefore with difficulty he could be engaged to dive into the sea of troubles and perplexities which then particularly surrounded the throne he was pressed to accept. However, having once accepted of the regal power, he was not to be daunted by these difficulties; they only excited him to apply with greater ardor and prudence, to the management of the war, and the administration of public affairs.—From this time he continued to oppose the different bodies of Danes, that were continually pouring in upon him, with various success. Sometimes, in order to get rid of them, he was obliged to enter into treaties with them, when the evacuation of his kingdom was not to be purchased at an easy rate from such mercenary plunderers. But as the several bodies of these infidels were independent of each other, and did not consider themselves bound by treaties made by those of a different party, those accommodations were of little avail.

At length, greatly weakened by the various battles they had fought, and dispirited by the repeated invasions of their enemies, the Englishmen gave themselves up to despair.—Those who could not fly, submitted to the victors, and preserved their lives at the expense of their happiness; others fled into Wales, in order to secrete themselves till some happy revolution should restore them to their country; while a few, unwilling to abandon their sovereign in his adversity, surrounded him with professions of loyalty and affection.

Alfred alone rose superior to this severe attack of fortune; with that magnanimity which the truly brave ever experience in the hour of danger, instead of giving way to despair, he determined to yield to the storm for awhile, and wait 'the rise of more auspicious stars' without forgetting for a moment his people's welfare.

The security of his family gave him the most pungent concern. He had early married Elswitha, daughter of Ethelred, a Saxon earl, surnamed for his merit the Great, and of Eadburgha, his wife, descended from the kings of Mercia. This lady, who by her birth, accomplishments, and beauty, was worthy of the high station to which he had raised her, Alfred loved with the sincerest affection, and had the happiness to find his love returned with equal sincerity. Heaven had already blessed them with several children, and they began to rejoice with the prospect of a numerous progeny.

How distressing, therefore, must Alfred's situation be, when this anxiety was added to his apprehensions for his unhappy subjects! But there was no alternative; he must either submit to a temporary separation from the objects of his tenderness, or run the risk of becoming a prey to his savage and inexorable enemies, whom it was now impossible for him to withstand. The former he prudently chose; and, after having placed his family in the most eligible security the times would allow of, till he could find a more secure retreat for them, he disguised himself in mean attire, and entered into the service of the person who had the care of his herds.

Whether he was known to the neatherd, and depended on his confidence, is uncertain—but that he remained unknown to the peasant's wife, is certified by the following incident related by Asser Menevensis. The disguised king sitting one day by the fire, absorbed in thought, suffered a cake, which his mistress had placed before it, to burn, notwithstanding she had given him orders to take care of it. The old woman severely reprimanded him for the neglect, telling him, that though he would not trouble himself to turn it, yet he would eat it fast enough when ready.

For more than a year, Alfred remained enveloped by this cloud of adversity; but Oddune, earl of Devon, with a few brave men who still retained their loyalty, having by a desperate effort put the principal body of the Danes to flight, and killed Hubba their general, he determined to live no longer in his present obscurity.

Having informed his friends of the place of his retreat, he desired they would come to him, that he might reap the benefit of their advice at this critical juncture. Several noblemen accordingly visited him at Athelney in Somersetshire, the place of his retirement. The result of their consultation was, that the nobles having collected, with the utmost expedition, all the troops they were able, they were to keep them in small bodies, in order to prevent suspicion, but to be ready to join each other at the king's command.

The most difficult, as well as the most important part of Alfred's plan remained yet to be executed; that was to gain intelligence of the posture of the enemy, who were still encamped in great force in the kingdom of Wessex, so that he might properly concert his measures for attacking them.

Alfred, not knowing on whom he could rely in the execution of an undertaking which required so much prudence and penetration, took the boldest resolution that ever entered into the head of a prince; he ventured into their camp, disguised like a harper, and having made himself master of their situation and discipline, returned without being discovered. Having likewise learned that they were soon to celebrate a grand festival in honor of some of their idols, he determined to take advantage of the riot and inebriety of that day. He accordingly fixed on Selwood forest for the general rendezvous of his troops, and on the appointed day attacked them, while they were employed in their sports, at Edington in Hampshire, which lay at some distance from their strong fortified camp. Not being prepared for so sudden an attack, the Danes were entirely routed, and almost their whole army cut to pieces. The few that escaped betook themselves to an adjacent castle, but were soon obliged to capitulate.

Notwithstanding the great advantage he had just gained, the English monarch treated the remaining Danes with his usual lenity. Such of them as would embrace the Christian religion, he permitted to take possession of the kingdom of East Anglia, on condition that they would oblige the rest of their countrymen to quit the island, and prevent, as much as lay in their power, any more foreigners from landing. Hostages were given for the performance of these articles; and such as would not part with their own religion, embarked for the continent, where they exercised their usual piracies.

By this signal and important victory, Alfred found himself, on a sudden, restored to a situation exceeding his most sanguine hopes. By one single battle he had expelled the Danes from his kingdom of Wessex, and regained entire possession of it. His scattered subjects, whom fear had driven from their houses, or constrained to submit to the enemy, now flocked with eagerness to renew their allegiance to him. And wishing farther to secure the friendship of Guthrum, the Danish chieftain, whom he had not only overcome by his arms, but by his courtesy, he gave him the kingdom of East Anglia, which was now inhabited entirely by Danes, reserving to himself the nominal sovereignty as monarch of all England.

Alfred soon became possessed of a greater extent of territory, and invested with more unbounded sway, than any of his predecessors had enjoyed; every sovereign within the island, even the British princes, who ruled over North and South Wales, either courted his friendship, or sued for his protection. And though different parties of Danes made at times attempts upon his coast, as the first step he had taken after his restoration had been to increase his navy, they were generally defeated, or driven away. Having thus secured his coasts, he diligently set about fortifying the rest of his kingdom with castles and walled towns, the want of which had greatly contributed to

the success of the Danes. He in particular added many strong works to the fortifications of London. And at length, but not till after many desperate encounters had taken place, he had the satisfaction to see peace and tranquillity restored throughout the island, after so many years of bloodshed and disquietude.

[To be concluded in the next Lyceum.]

Republicanism of Lyceums.

Almost every institution in civil society has some features which are anti-republican. They do not and cannot bear equally upon all classes of the community. In some respects they have a tendency to elevate the high and depress the low.

It is neither within the design nor the power of *colleges* to extend their advantages equally to all classes. But a small portion of the community can profit directly by their instructions; and this small portion but a very short period of their lives.

Nor can *academies* extend their advantages alike to all. A small portion of the children in towns where they are established, are benefitted by them. They have even been found in some instances to injure common schools, and of course to diminish the advantages offered to the great mass of children.

High Schools are in many instances decidedly anti-republican in their tendency and results. They necessarily shut out ninety-nine hundredths of the community from their benefits. They are confined to a very small portion of the most wealthy families. And by calling off interest and patronage from common schools, they are calculated to elevate the few at the expense of the many.

Common Public Schools are undoubtedly among our most purely republican institutions. But even they do not offer like advantages to all; and they do not offer or propose instruction to any but for a very short period of life.

Many *associations for mutual improvement* are anti-republican in an eminent degree.—They are confined to those who are already much in advance of the *great mass*, and especially the *industrious classes* of the community. Their tendency and design is to elevate the high and depress the low—to widen the distance between the enlightened and the ignorant, the rich and the poor.

Perhaps these same charges may in some measure be brought against the Lyceum; but probably to a less extent than against any other institution which can be named. It is republican in its origin—it was commenced by a *voluntary* association of *farmers and mechanics*. It is republican in its organization. The Lyceums for counties, towns, states, and the nation, are elective and representative bodies—not self-constituted, and out of the power of control by the people. The whole power lies in town Lyceums—*in the people*.

The Lyceum is republican in its design; it aims at the diffusion of knowledge among all classes, all ages, and both sexes. Its doors are open as wide to the poor as to the rich—to the most unlearned as to the most enlightened—to the most industrious farmer and mechanic, as to the man of leisure or the philosopher—to the child of six, and the man or woman of sixty years of age—to gentlemen and ladies.

It is republican in its *instructions*. It gives familiar and practical instruction. It not only aids farmers and mechanics in becoming more enlightened men, but better farmers and mechanics. It acquaints them with the principles on which their arts are founded, and their success depends. It enables them to avoid and correct mistakes; to take advantages of circumstances; to make improvements; to bring the elements and the laws of science to their aid.

It is republican in its *results*. It makes other institutions more republican; it elevates the character of schools, and extends their advantages more equally to all; it brings the influence of the Academy, the High School, and the College, into the daily walks of life—into the farm-house and work-shop. It gives an opportunity for the man of a literary profession, and the practical farmer and mechanic, to instruct each other; the one it makes more practical, and the other more scientific.

The Lyceum, more than any other institution, is able to give republicans a knowledge of their *political rights*—of the nature and genius of their government—of the true policy of governments, and the tendency of political measures—to secure them against the intrigues of demagogues, and the oppression of despots—to enable them to understand and maintain the rights of republicans and of men.

Lyceums are calculated to give *intellectual* and *moral power* and *freedom*, without which, all other freedom can exist but in name. A slave to ignorance or passion is the most degraded slave. It is a blessing to an individual who can neither understand nor practice right, to be led, or even compelled to it, by some kind master. It is not a blessing to the community merely in which he lives, but to the individual himself, to do right rather than wrong, even if it is by compulsion.

Without moral and christian freedom, there is no Republicanism. The Bible, undoubtedly, contains more pure republicanism, than any other book—than all other books. Other codes, any code, may be republican in name and pretence; but the christian code, and those built upon it, are alone republican in reality, in their tendency—their results. That makes all free, and equally free—free from the chains and the lash of a master without, and a more cruel and unrelenting master within—free from the chains of a slave-ship—a heartless politician—an aspiring demagogue—a cruel despot—from ignorance—from bigotry—from passion—from guilt.

Methodist Polity.

Few men who have lived upon the earth have left behind them a loftier or more imperishable monument of their own wisdom, or a richer bequest to their fellow-men, than John Wesley. In addition to the purity of his heart and the power of his intellect, which enlightened and blessed so many thousands during his life, the plan which was originated and completed in his mind to operate when he was gone, is at this time more successful and happy in its operations, than it was beautiful in its design.

The prudential and economical arrangements, now in operation by the denomination of Methodists, are at this time producing results in giving to the gospel an extension and a power, which can be claimed by no others. These arrangements are founded in the well-known principles of the human mind; and so long as the mind continues in an unperverted state, this system which was prepared by Wesley, must continue to enlighten and bless mankind.

A system of operations which has produced and is now producing such mighty results in the cause of religion, is scarcely less applicable in the cause of education.—When such is the fact, it must be gratifying to the lovers and friends of knowledge, to see those who understand this subject best, so ready and prompt in their efforts to throw the weight of their influence into the scale of education.

It may be doubted if any two journals in the country are at this time exerting a greater or better influence in the cause of *common education*, in the strictest and highest sense of the word, the *education of the people*, than the Christian Journal, of New York, and the Christian Herald, of Boston, both conducted and sustained by the members of the Methodist denomination, and both managed with intelligence, talent, and liberality worthy of imitation.

Between the Methodist Polity and the Lyceum System there is so near resemblance, that they differ more in their object than in their form and spirit; and whether applied to the extension of the gospel, or the advancement of science, while they retain their form and move in their spirit, they can never fail to make men wiser and better—more noble and more happy.

Although we do not customarily worship with this denomination, we know many of its members, whom we respect as men, and love as christians.

Illinois State Lyceum.

The first annual meeting of this institution was held at Jacksonville, in the Presbyterian meeting house, at 3 o'clock P. M. Aug. 16th, 1832.

Present, Edward Beecher, J. F. Brooks, B. Y. Messenger, Thos. A. Spilman, Maro McL. Reed, Hubbel Loomis, Henry Jones, J. M. Sturtevant, J. M. Peck, Thos. Lippencott, and John Russell.

The President in the chair. Prayer by J. M. Peck.

The names of all the members of the Lyceum, whether present or absent, were called over, and communications from the following gentlemen were read.

A '*Historical sketch of the early settlement of Illinois, from* 1780 *to* 1800,' was read by J. M. Peck, of Rock Spring.

A Dissertation on the '*Power of knowledge*,' was read by J. F. Brooks, of Belleville.

An Essay on '*Sacred Music*' was offered by Thos. A. Spilman, of Hillsboro.

A Letter from George White, of Hillsboro', was read, apologizing for absence, and urging Botanical researches in Illinois.—This letter was accompanied with a collection of nearly one hundred Illinois plants.

The Librarian reported some donations of books and periodicals to the library, and that some progress had been made in collecting specimens of minerals.

The following resolutions were then passed:

1. Resolved, that the corresponding committee determine the mode and terms on which Lyceums may become auxiliary to this institution.

2. Resolved, that in accordance with the fifth article of the constitution, each member is required to contribute labor *annually* as a condition of membership.

3. Resolved, that the following persons be admitted as members, themselves or their friends having given the pledge for annual labor.

John T. Jones, Jacksonville.
John B. Bryant, do.
William S. Emerson, Lower Alton.
John Messenger, St. Clair county.
Gilman Kendall, Greenville, Ill.
Charles Jones, Jacksonville.
Stephen W. Spencer, Bluffdale, Ill.
Cyrus L. Watson, Rushville, Ill.
William Kirby, Jacksonville, Ill.
Alvan Bailey, Edwardsville, Ill.
Gardner Bartlett, Winchester, Ill.
Cyrus Edwards, Alton, Ill.
Lucien Farnum, Lewiston, Ill.
Ero Chandler, Jacksonville, Ill.
James G. Edwards, do.

4. Resolved, that when this Lyceum adjourn, it adjourn to meet in Vandalia, on the first Thursday in December next.

5. Resolved, that those members of the Lyceum who have not complied with the terms of membership, be requested to perform such services as they judge expedient, and as come within the objects of this institution, by the time of the extra meeting at Vandalia.

6. Resolved, that all gentlemen in this state, who write or compile books or pamphlets or any kind of periodicals, be requested to furnish the Librarian with a copy.

7. Resolved, that a committee of three be appointed, which shall be called the '*Book Committee*,' whose duty it shall be to examine, preparatory to recommendation, books, maps, and pamphlets, that any member of the Lyceum may choose to publish, and may wish to have pass under such a revision: said committee to be appointed annually.

The following officers and committees were elected:

Edward Beecher, President.
James Hall, } Vice Presidents.
J. M. Peck, }
John Russell, Secretary.
Maro McL. Reed, Librarian.

Corresponding Committee.

Julian M. Sturtevant, George White, John T. Jones, Hubbel Loomis, Thomas Lippencott.

Book Committee.

Edward Beecher, J. M. Sturtevant, and John Russell.

8. Resolved, that J. M. Peck, and John Russell prepare an account of the anniversary, and the proceedings of the Lyceum for publication.

9. Resolved, that J. M. Peck be requested to furnish a copy of his sketch of the early history of the American settlements in this state, for publication in the Illinois Magazine.

And the Lyceum adjourned.

JOHN RUSSELL, Sec'y of the
Ill. State Lyceum.

Note. Letters and written communications should be addressed to John Russell, Postmaster, Bluffdale, Ill. Books for the library, periodicals, specimens of minerals, fossils, and plants, should be sent to Maro McL. Reed, Librarian, Jacksonville, Ill.—*Illinois Pioneer.*

VERMES or WORMS.

ANIMALCULES.

These constitute a division of animals which until the latter part of the 17th century had escaped all human attention and investigation, and constituted a kind of invisible world: a series of beings, the structure, powers, and properties of which are, perhaps, more astonishing than those of most other animals: yet of such minuteness as, in general, to elude the sharpest sight, unless assisted by glasses. The ancients therefore were totally unacquainted with this class of beings. To them the mite was made the *ne plus ultra*, or utmost bound of animal minuteness; but the moderns, assisted by the invention of the microscope, have discovered whole tribes of animals, compared to which even mites may be considered as a kind of elephants. These minute beings are chiefly to be observed in fluids of various kinds; and principally in such as have had any animal or vegetable substances infused in them; and for this reason they are often called in modern zoology by the title of *animalcula infusoria*, or infusorial animalcules. A most extraordinary idea was entertained by the celebrated Count de Buffon, relative to these animalcules, viz.: that they were not real animals, but a kind of organic particles or moleculæ, which were capable, under certain circumstances, of being formed into animated beings. The experiments of Spallanzani and others have, however, completely overthrown this chimerical and absurd theory of the Count de Buffon; and indeed one would hardly think it possible for any person of unprejudiced mind, nay one may even add, of common sense, to view the several animalcules in fluids, and at the same time to doubt of their being real animals. Their rapid and various motions; their pursuit of the smaller kinds on which many of the larger prey; their avoiding each other as they swim; the curious and regular structure of their bodies; and their whole appearance, form the most convincing proofs of their real animal nature and life.

Animalcules, as before observed, are most frequently found in fluids; but this is a doctrine that has not always been clearly understood, and has been productive of some erroneous ideas in natural history.—Some writers, for instance, have asserted that almost every kind of fluid abounded with animalcules; and that wines and spirits exhibited legions of them. This, however, is so very far from the truth, that none are ever to be discovered in inflammable spirits, or in any fermented liquor that has not passed either into the state of vinegar, or that is not grown completely vapid. As almost all extraordinary discoveries are liable, when related by unskilful persons, to have their circumstances exaggerated by additional ornaments, we need not be surprized that this has been the case relative to the history of microscopic animalcules.—No sooner did the microscopical observations of Leewenhoeck and a few others become pretty generally known, than immediately, as if by a kind of fatality, the animalcular doctrine was carried a great deal too far: and innumerable substances were supposed to swarm with these minute beings, which later and more accurate observations have proved to be totally free from them. Thus, the blueish or bloomy appearance on the surface of several sorts of plumbs, grapes, and many other fruits, has been supposed owing to innumerable legions of animalcules on the surface of the fruit: but this idea is entirely erroneous. It happens, a little unfortunately, that Mr. Pope has introduced it into his celebrated poem, the Essay on Man, which still continues to propagate the mistake amongst those who are not scientifically conversant in such subjects.

The blueish appearance above-mentioned is a mere vegetable efflorescence, which regularly takes place on such kind of fruit, and consists of particles of no determined shape, and has not the least appearance that could lead to a supposition of its being of an animal nature.

To attempt a methodical enumeration of animalcules, appears, at first view, almost a hopeless labor; since exclusive of the vast variety of species, (of which, in all probability, only a small part has yet been observed,) many of them have a power of changing their shape at pleasure: so as to appear widely different at particular times from what they did the moment before; and others, though their form is constant, are apt to vary in color; by which means some deception or obscurity may arise, and an uncertainty in determining the species. Much however has been done: a great many species of animalcules have been perfectly well described, and are perfectly well known to microscopical observers, since they possess characters too clear and plain to admit of any doubt of their species, whenever they happen to appear.

As examples of this curious and interesting race of animals, we shall particularize a few of the most remarkable kinds, and such as are well figured in the works of naturalists.

Among these, the genus called vorticella is one of the principal. Its character is, that the mouth or opening is surrounded by numerous short feelers, forming a kind of fringe round the head. One of the most elegant species of vorticella is the vorticella convallaria, a beautiful transparent animalcule, the body of which is formed like a bell-shaped flower, and is furnished with a very long tail or stem, by which it affixes itself to whatever substance it pleases. When a group of these animalcules is viewed by the microscope, it exhibits the appearance of a set of animated flowers, alternately stretching out their stems at full length, and again suddenly contracting them in a spiral twist. This species is very common, and is

generally found attached to the stems and under surface of the leaves of the common lemna minor, or duckweed.

But a still more elegant species is the vorticella racemosa. It is found during the summer months in clear stagnant waters, attached to the stalks of the smaller water-plants, and other objects; to the naked eye the whole group, on account of the great number of individuals composing it, is distinctly visible, in the form of a small whitish spot, resembling a kind of slime or mouldiness, but when placed under the microscope in a drop of water on a glass, its extraordinary structure is immediately perceived. From a single stem proceed, at various distances, several smaller ramifications, each terminating by an apparent flower, like that of a convolvulous, and furnished on the opposite edges with a pair of filaments resembling stamina. The whole is in the highest degree transparent, and perfectly resembles the finest glass; while the varying motions of the seeming flowers, expanding and contracting occasionally, and turning themselves in different directions, afford a scene so singularly curious, as to be numbered among the finest spectacles which the microscope is capable of exhibiting. Each animal, though seated on the common stem, is complete in itself, and possesses the power of detaching itself from the stem, and forming a fresh colony from itself.

To the genus vorticella also belongs the celebrated animalcule called the wheel-animal, from the appearance which the head in some particular positions exhibits; as if furnished with a pair of toothed wheels, in rapid motion: this animalcule, which is called vorticella rotatoria, has long ago been pretty well described and figured by Baker, in his work on the microscope: it is of lengthened shape, and of a pale brown color, and is of such a size as to be sometimes perceptible by a sharp eye, even without a glass. It is remarkable for its strange power of reviviscence, or restoration to life and motion.—[*Gallery of Nature and Art.*

CAVES.

FINGAL'S CAVE.

Fingal's Cave, situated on the island of Staffa, is esteemed one of the most splendid works of nature. The island lies seven miles NNE. of Iona, and is noted for its basaltic pillars, rising in colonnades, generally above 50 feet high, and where most elevated, 112 feet above high water mark, and standing upon a basis of solid unshapen rock. The pillars are of three, four, or more sides, but the number of those with five and six exceeds that of the others. The island has excellent pasture, but at present no house; and the want of a shelter from an occasional storm has frequently proved a cause of inconvenience to the visiters, who in summer crowd to this far-famed spot. Besides Fingal's there are also others, as Great Cave, Boat Cave, and Mackinnon's or Cormorant's Cave.

The cave of Fingal, which fronts the south-west, is celebrated by all travellers who have visited it, in terms of unbounded admiration. 'The mind,' says Sir Joseph Banks, 'can hardly form an idea more magnificent, than such a space supported on each side by ranges of columns, and roofed by the bottoms of those which have been broken off to form it; between the angles of which a yellow stalagmitic matter has been exuded, which serves to define the angles precisely, and at the same time with a great deal of elegance; and to render it still more agreeable, the whole is lighted from without, and the air perfectly free from the damp and noxious vapours with which natural caverns generally abound.'

The outline of the aperture of this cave, when viewed in such a light as shows it distinctly, is perpendicular at the sides, and terminates above in a species of Gothic arch. The height, from the top of the cliff to the top of the arch, is 30 feet; from the top of the arch to the water at mean tide, 66 feet. The length of the cave is 227 feet; breadth of the entrance 42; its height within, from 42 to 50 feet. The sides, like the front, are in general perpendicular, but the columns are frequently broken and irregularly grouped.

'Compared to this,' says Sir Jos. Banks, 'what are the cathedrals or palaces built by man! mere models or play-things, imitations as diminutive as his works will always be when compared to those of nature. Where is now the boast of the architect! regularity, the only part in which he fancied himself to exceed his mistress, Nature, is here found in her possession, and here it has been left undescribed for ages. Is not this the school where the art was originally studied? And what has been added to this by the whole Grecian school? a capital to ornament the column of Nature, of which they could execute a model only; and for that very capital, they were obliged to a bush of acanthus. How amply does Nature repay those who study her wonderful works!'

'It would be no less presumptuous than useless,' says Mr. Macculloch, 'to attempt a description of the picturesque effect of that to which the pencil is inadequate. But if this cave were even destitute of that order and symmetry, that richness arising from multiplicity of parts, combined with greatness of dimension and simplicity of style, which it possesses; still the prolonged length, the twilight gloom, half concealing the playful and varying effects of reflected light, the echo of the measured surge, as it rises and falls, the transparent green of the water, and the profound and fairy solitude of the whole scene, could not fail strongly to impress a mind gifted with any sense of beauty in art or in nature.'—[*Worcester's Sketches.*

CHEMISTRY.

CHEMICAL AGENTS.

In our last we gave a few examples to distinguish chemical from mechanical science. In this we will mention a few of the principal employed in effecting chemical changes, and in carrying on chemical operations.

Heat is more universally diffused and more extensively active than any other agent in acting upon other bodies. It is probably in combination with every particle of matter in the universe. Though a great portion of it is carefully concealed from common perceptions, and wholly insensible to our feelings, it still exists, and may be brought out so as to appear in its true character. The slacking of lime by water, is an example where two cold bodies may be made to give out an intense heat—to give up heat which has lain concealed perhaps for thousands of years. Every instance of combustion, from the gentle burning of a gas-light or a lamp to the general conflagration of a city, is an example of the nature and power of heat.

In domestic economy, and all the useful arts, heat is either directly or indirectly an important and necessary agent. No other article of living is so expensive, or so indispensable to our comfort. No other is deserving of so much attention.

Oxigen, next to heat, is more extensively engaged as a chemical agent than any other substance. It constitutes nearly one quarter of the atmosphere, about seven eighths of water, a large portion of animal and vegetable substances, a part of most ores of metals, of all rocks, mountains, and soils: in a word, oxigen appears to be diffused through earth, ocean, and air—through the animal, vegetable, and mineral kingdoms. And it is as powerful in its operations as it is extensive in its existence.

Next to oxigen, iron is perhaps more extensively diffused through our planet, than any other substance. This useful material is not only deposited in extensive beds in almost every part of the earth, in sufficient abundance to be wrought and applied to the arts; but almost every other mineral, and even most animal and vegetable substances, contain a portion of iron. This, like every material our Creator has provided in abundance, is also active in the great operations of nature and the arts.

Hydrogen is another chemical agent extensively and actively employed in the processes of nature. It constitutes a part of the whole animal and vegetable kingdom, a portion of water, and as a part of vapor, it is always diffused through the atmosphere, and always active.

Carbon, as a chemical agent, constitutes a large portion of the vegetable kingdom, and a part of the animal, is diffused through all the lime rocks upon the earth, enters into many other minerals, and constitutes the whole of the diamond.

Metals are very important agents, both in nature and the arts; and though they cannot be even enumerated on the present occasion, they will be presented in our future numbers, in their properties, relations, and uses.

These simple agents, and others which might be mentioned, are variously and intimately combined with each other; and by these combinations constitute all the bodies and perform all the operations in chemical science and the chemical arts. It is thus that the atmosphere, water, the acids, alkalies, earths, salts, animals, vegetables, minerals, paints, dyes, all the farmer's produce, every article in domestic economy, most of the operations of the farm, the work-shop, and the kitchen, have their existence.

These substances, and these operations, with their various relations, combinations, and results, it is our design to bring forward in our columns, in such a connected manner, as to give to those who pursue it, a systematic and practical view of the very interesting and very useful science of Chemistry.

METALS.

MERCURY.

Mercury; called also quicksilver, always appears in a liquid state, in the common temperature of the atmosphere; but in intense cold, as at 40 below zero, it becomes solid, and is then malleable, resembling silver. It is found in nature, sometimes in a pure state, but chiefly united to sulphur, when it forms cinnabar; and sometimes to silver. It is also united to the acids, and to oxigen. It is mostly found in Spain and South America. Like other fluids, it boils, and is converted into vapor. This process is employed to separate it from other substances. It is acted upon by most of the acids. It combines with sulphur and phosphorus; and forms alloys with most of the metals, which are then called amalagams. On this property depend some of the methods of gilding and of silvering mirrors. When acted upon by heat and air for a long time, it absorbs oxigen, and is converted into a real oxide, called precipitate per se, or red oxide of mercury. When the heat is increased, this oxide gives out its oxigen, the mercury reassuming its metallic appearance When agitated long in air, mercury is converted into a black oxide. [*Port. Encyc.*

SIMPLE COMBUSTIBLES.

1. *Hydrogen*, which like oxigen, is a gas, and was first called inflammable air; its discovery belongs to Mr. Cavendish. It is the lightest of all gaseous bodies; is colorless, invisible, and possesses the mechanical properties of air. Hydrogen may be obtained by putting some clean iron-filings or small chippings into a glass retort, and pouring over them sulphuric acid diluted with thrice its bulk of water. A violent effervescence instantly takes place; gas issues in abundance from the beak of the retort, which may be received over water. This gas, although combustible when in contact with the atmospheric air, extinguishes a taper, or even lighted phosphorus when immersed in it. Its specific gravity is 0,0694; and from its great levity it is used for inflating balloons.

2. *Carbon*, in its purest form, is known only in the *diamond;* but it may be procured in a state of *charcoal* by burning a piece of wood covered with sand, in a crucible. Charcoal, the combination with which we are the most familiar, is the coaly residuum of any vegetable that has been burned in close vessels. It is generally black, sonorous, brittle, very light, and destitute of taste or smell. Charcoal is a powerful antiseptic, has great affinity for oxigen, is unalterable and indestructible by age, and, if air and moisture be excluded, is not affected by the most intense heat.

3. *Phosphorus*. This substance is obtained by pouring acetate of lead into urine, and distilling the white powder which precipitates, with some charcoal, in an earthern retort, by means of a strong heat. The beak of the retort must be inserted in water; the phosphorus will drop into the water like melted wax. Phosphorus, when pure, is semi-transparent; of a yellowish color: it is soft, and may be cut with a knife. It melts at the temperature of 99°. When exposed to the air it emits a white smoke, which in the dark is luminous. It must be kept in phials of water, closely corked up. The compounds which phosphorus forms with other substances are denominated *phosphorets*.

4. *Sulphur*. This is one of those combustible substances which have the greatest tendency to combination. It is a hard brittle substance of a yellow color, and with little taste. It is a non-conductor of electricity; and becomes electric *negatively* by friction. At the heat of 170° it rises up in the form of a fine white powder, well known by the name of flowers of sulphur.

5. *Boracium*. This substance was discovered by Sir H. Davy. To procure it, equal parts of the metal called polassium and dry boracic acid must, for a few minutes, be exposed in a copper tube to a slight red heat. When cold, the mass must be washed out with water, and the potash saturated with muriatic acid, and the whole filtered. The matter which remains must be washed and dried, and this is *boracium*. It is of a dark olive color, opaque, and brittle, and has some remisemblance to charcoal. [*Portable Encyclopædia.*

SPURZHEIM ON EDUCATION.

Dr. Spurzheim's treatise on education, published since his death, takes cognizance of the original powers of man which are the subjects of education or training, and the proper mode of training them. It takes a view of the three fold nature of man, as a physical, intellectual and moral being. It also designates the faculties in each of these departments, both in their number and degree as they are found in different individuals, and in the two sexes.

Great stress is placed on female education and the duties of mothers. Dr. S. considered females as a part of God's creation no less important than that of the other sex, though designed for a different, though not an inferior education.

The growth and final strength of the human powers, whether of a physical, intellectual or moral nature, are considered as depending principally and equally upon exercise. He thinks that the intellectual powers have been cultivated at the expense or neglect of the moral faculties; that the moral faculties are the most important, and that christianity contains the only pure moral code ever given to the world.

LESSONS IN MINERALOGY.

When the manuscript of Miss Welsh's treatise on Mineralogy was put in our hands, we were able to do little more than to ascertain the general plan and spirit of the work, which we approved. After it was published, a copy was put into our hands when we gave it another cursory examination, from which we found no reason to change our opinion. We have recently given it a more careful reading, and find it to contain a greater amount of useful matter than we had supposed, served up in such a style, as to render it a worthy companion of every family and every school.

MOTHERS' MAGAZINE.

We have just examined the first number of a proposed monthly periodical under the above title, to be conducted by Mrs. Samuel Whittesey of Utica, N. Y. The importance of a journal, to aid mothers in their high and responsible duties, is so great, as almost to excite wonder that one has not been commenced before. The interest of no class of the community is probably more easy or more important to secure, than that of mothers in behalf of their children; and no one who knows Mrs. Whittlesey will doubt her competency to securing or promoting it.

The magazine is to be under the patronage of a maternal association in Utica, which has invited Mrs. W. to commence and conduct the work, upon her own responsibility with the aid of that and similar associations which are or may be formed.

Not knowing that we can better express our views on this interesting subject than we have already done in the first number of the Lyceum, we take the liberty to transfer a short paragraph for the present occasion. We do this from a belief, that mothers' associations ought to be formed in every town and village throughout the Union, and that they would have many advantages as being departments of Lyceums.

MOTHERS' LYCEUM.

The dignified office, the holy charge and the high responsibilities of a mother, are every day more duly appreciated, and more deeply felt. When they have attached to them all the importance, all the power and all the dignity which is justly their due, we shall have opened to us new prospects, and have presented to us a new, a better, a holier world.

Perhaps no class of the community, can benefit themselves and the world so much by mutual efforts, as mothers. None more need the views, the experience, and the council of each other. None would perhaps be more eager to learn, or more ready to profit by even a hint which should be thrown out than those who have committed to their charge those tender buds, which their fond hopes would inspire them to believe are destined to bloom, flourish, and bear fruit in eternity.

Where can mothers find so much to encourage and strengthen their mutual efforts, as at the Lyceum, with juvenile and infantile books, its apparatus and specimens of nature, always animating and always instructive to children?

COMPARATIVE METEOROLOGY.

It is gratifying to find other Journalists entertaining the same opinions on the importance and practicability of having tables of meteorology kept in different places in our country and upon the globe in such a way as to give a comparative view of the weather on various parts of our earth, and by it to get some new light upon the theory of winds, climate, &c. We are glad to see this subject taken up by the Railroad Journal, and several other papers devoted to the diffusion of useful knowledge. In our next, we shall extract some tables from the paper above named into our columns, and shall be glad to co-operate on this subject with Journals in different parts of the Union.

LYCEUM SEMINARIES.

The greater part of the Mississippi Valley is divided into townships six miles square: each township is divided in thirty-six sections one mile square; the sixteenth, or one of the four most central sections, containing 640 acres, is appropriated by Congress for the benefit of Education. If each school section, or if one in ten, was made the foundation of a Lyceum Seminary, or Self-Supporting School, a fabric of education would be erected for the Great Valley of our globe, more noble than the world ever saw.

WINTER SCHOOLS.

The teachers and parents who attend the convention invited by the Framingham Lyceum on Wednesday next, will have an opportunity to procure apparatus for their schools or families. A collection from the members of schools of 20 or 30 cents each, will be sufficient to procure a set for their use.

BOOK OF NATURE.

BIRDS.

'But who the various nations can declare
That plough with busied wing the peopled air?
These cleave the crumbling bark for insect food;
Those dip the crooked beak in kindred blood;
Some haunt the rushy moor, the lonely woods;
Some bathe their silver plumage in the floods.'

THE OSTRICH, the EMU, and the CASSAWARY, are not only remarkable, by reason of their superiority of size, but seem to claim our first attention among the feathery tribes, on account of their constituting some of those apparent links, by which the winged is united to the order of Quadrupeds. For although these animals resemble birds in the outline, and in several parts of their conformation, they certainly cannot be classed among the more perfect orders of the species, in as much as they do not make use of their wings for the purpose of flying; and as to internal formation, the Ostrich is said to have as great a resemblance to the four-footed as to the volatile order.

The structure of these creatures, as well as their appetites, is however well adapted for the situations in which they are severally placed, and they appear to know well how to supply the defect of some of their members by the use of which they make of others.

Of all animals that move on their legs the Ostrich is by far the swiftest; and although the Arabians train their fleetest horses for the chace, it is not likely they would be successful in the pursuit of this animal, were it not for his circular manner of running. Nor is this surprising, when we consider that this lofty mass of light materials is not only carried forward by his long springing legs, but is impelled along by his wings, which he keeps in constant motion, and apparently serve the purpose of oars.

The EMU, or Ostrich of the new continent, is also a remarkably swift runner, but its manner of assisting its legs is somewhat different from the former; besides making use of something behind, like a heel, to push it forward, this animal uses a kind of action peculiar to itself, first lifting up one wing and keeping it elevated for some time in form of a sail, then letting it drop and elevating the other; by this means it moves along with such rapidity, that even the Grayhound can seldom overtake it. The favorite climate of the Cassawary seems to begin, where that of the Ostrich terminates in the old world, and although its wings are so very small, that being covered with the hair on the back they are scarcely perceptible, it kicks up behind with the one leg, and then making a bounce forward with the other, proceeds with such amazing speed, that the swiftest racer would be unable to maintain the pursuit!

In the structure of Birds of the more *perfect order*, a few things demand our most serious attention.

The whole *body* is shaped in the most convenient manner for making their way through the air; being, as Mr. Ray observes, constructed very near Sir Isaac Newton's form of least resistance. According to Bar, in his continuation of Buffon, 'It is neither extremely massive nor equally substantial in all its parts; but being designed to rise in the air, is capable of expanding a large surface without solidity. The body is sharp before, to pierce and make its way through that element; it then gradually increases in bulk, till it has acquired its just dimensions, and falls off in an expansive tail.'

The motion of this order being two-fold, walking and flying, they are provided with *legs* at once wonderfully contrived to walk with, and raise them like a spring for their flight; *wings* to buoy them up and waft them along; and a *tail* to keep them steady in the air, assist them in their evolutions, and to direct their course.

Although their feathery covering is admirably constructed for lightness and buoyancy, their wings are furnished with a strength that is amazing; so that the flap of a Swan's wing has been known to break a man's leg; and a similar blow from an Eagle has produced instant death; and by these they are enabled to impel themselves forward with a rapidity that exceeds the fleetest quadruped. To fit them the better for their flight, the feathers are disposed in the most perfect order, lying one way; and that they may glide more smoothly along, they are furnished with a gland situated on the rump, from which they occasionally press out oil with the bill, and anoint the feathers. In water-fowl this oil is so plentiful, that by it their plumage is rendered completely water-proof.

The *beak*, or bill of birds, is a curious piece of art, formed of a hard horny substance, constructed in the most commodious manner by piercing the air. Their *ears* stand not out from their head to retard their flight, while their *eyes* are placed in such situations as to take in nearly a hemisphere on either side.

Birds have no teeth to chew their food; but those of the granivorous kind are provided with two stomachs; in one of which the victuals are softened and macerated before they enter the other to be completely digested. Being often employed in traversing the upper regions, where they behoved to be much incommoded did they bring forth their young in the manner of quadrupeds, their manner of generating is wisely made to differ, and their offspring are produced by means of eggs. In the speedy growth of young birds, by which they acquire a degree of strength and size so as to be able so soon to provide for themselves, we have also an instance of the tender care of Providence.

What power unseen inspires these little creatures with the 'passion of the groves,' at the most fit season for forming their alliances!—when the genial temper of the weather covers the trees with leaves, the fields with grass, and produces such swarms of insects for the support of their future progeny? And how comes it to pass, that no sooner is the connubial league formed, than those little warblers (a pattern to new married couples in humble life, who have nothing but their own industry to depend on,) immediately set about building their nests, and making preparations for their tender offspring?

In the building of their nests, what art and ingenuity are displayed! Whether they are constructed from the collected portions of clay or mortar, or from the more light materials of moss and straw, these little creatures contrive to mould them into the most convenient forms, and to give them a durability proportionate to their wants!

'It wins my admiration,
To view the structure of that little work,
A bird's nest; mark it well within, without,
No tool had he that wrought, no knife to cut,
No nail to fix, no bodkin to insert,
No glue to join! *his little beak was all!*
And yet how neatly finished.'

Nor is the wonder less, that birds of the same kind, however widely separated, should all follow the same order of architecture in the construction of their habitations; that each should make choice of the situation most suitable to its kind,

'Some to the rude protection of the thorn
Commit their feeble offspring; the cleft tree
Offers its kind concealment to a few;
Their food its insects, and its moss their nest.
But most in woodland solitudes delight.'

But still that all should agree in laying as many eggs as to be sufficient to keep up their species, yet no more than they can conveniently hatch and bring up.

In the *incubation* with what patience do these creatures sit on their eggs when necessary, till the young are ready to be hatched, and then how officious in assisting the little prisoners to escape! With what inimitable care do they afterwards watch over and provide for the brood until it is capable of doing for itself; and with what scrupulous exactness during this period do they distribute to each his allotted portion of food.

'What is this Mighty Breath! ye sages say,
That in a powerful language, felt, not heard,
Instructs the fowls of heaven?—What but God,
Inspiring GOD! who, boundless Spirit all,
And unremitting Energy pervades,
Adjusts, sustains, and agitates the whole.'

These observations are applicable to the feathery tribe in general; but if we turn to the peculiarities of a few of the different species we shall observe that the wisdom and the goodness of the Deity are no less conspicuous. The Ostrich, formed to traverse the burning sands of Africa, is long legged, light, and amazingly agile. Denied the natural reservoir of the Camel, it is endowed with such an abstinence from water, that the Arabs assert that it never drinks! and as it may roam many hundreds of miles in quest of vegetation, it seems to have an appetite for almost every kind of food. So that there is no desert, but what possesses sufficiency to supply these creatures with provisions, for they eat almost any thing. Glass, stones, iron, &c. have been found in their stomachs; and it is affirmed that in one was found a piece of stone that weighed upwards of a pound.

The Conder of America, is said to be the largest bird endowed with flight; and being of the rapacious kind, is armed with a beak so strong as to pierce the hide of an ox.

The Eagle, the most noble of rapacious volatiles, has a taste too nice for carrion; and in order that he may secure his *living* prey, and bear it in safety to his nest in the inaccessible cliff, nature has endowed him with the faculty of vision in an eminent degree, prodigious claws, amazing strength, and a profusion of feathers down to his very toes.

The Vulture delights in carrion and putridity; and this excellent anatomist may at once be distinguished from the Eagle by the nakedness of his neck and head, as well as that acute sense of smelling, by which, according to Herodotus, he can smell a dead carcass at the distance of fifteen thousand paces.

How admirably formed are the eyes of the *birds of night* for seeing better when the sun is below than above the horizon. Those of the *poultry* kind are not furnished with hooked bills and formidable talons, or wings calculated for long flights; and while the solitary Eagle or Hawk pay us a transient visit, unaccompanied and alone, these surround our dwellings in numerous flocks. Those of the Grouse kind, who feed on moor-berries and the top of heath plants, have their habitations assigned them in the most barren and uncultivated tracts where their favorite food abounds. The hooked bill of the Parrot is well contrived to assist him in climbing. Ducks, Geese, and many others, have long broad hooked bills to enable them to grope for their food in water and mud; on the contrary, a thick, short, and sharp-edged bill, is as necessary to those who have occasion to husk and flay the grain they swallow. The Wood-pecker's bill is sufficiently strong to dig holes; that of the Swallow is tender and sharp pointed, and he is also furnished with a very wide mouth to enable him to catch the winged insects in its flight; and the ease with which Sea-pies raise their favorite food from the rocks, by means of their long, narrow, and compressed bills, is astonishing. Even Limpets, which adhere so firmly to the rock, as not to be easily separated by a knife, these birds find no difficulty to raise with the instrument nature has provided them with for the purpose.

The long legs and necks of birds of the Crane kind, together with their sharp-pointed bills, are wonderfully adapted for the purpose of wading and picking up their food at the bottom of the shallows; and the webbed feet, oily feathers, and broad bills of those of the Swan kind, are equally so as to enable them to swim along, and lay hold of their prey in the watery element.

The Pelican of the wilderness is a most dexterous fisher, and nature has provided him with a prodigious pouch, of a singular construction, under his bill, which, although scarcely perceptible when empty, enables him when full to bear ashore as many fish at a time as would suffice sixty men for dinner. The Albatros, the most formidable of the Gull kind, preys not only on fish, but water-fowl of an inferior size; and his bill terminates in a crooked point, by which he is enabled to lay hold of them on the wing. The Penguin seldom leaves the water; and while others of the feathery race only skim its surface, pursues his prey to the greatest depth, and he approaches the finny tribe in his formation as well as in his disposition and habits. Indeed, these animals may be justly reckoned one of the connecting links betwixt the volatile and finny tribes, as not only their fin-like wings and broad webbed feet, but their body being covered more warmly all over with feathers than any other bird whatever, and the particular construction of their lungs, all tend to shew that water is their principal element.

How wonderful the *migration* of birds! or that surprising instinct by which 'the stork in the heavens knoweth her appointed times,' 'and the crane and the swallow observe the time of their coming.' When Storks take their departure for Europe, it is said they all assemble on a particular day, decamp during the night, and leave not a single one of their company behind. Now what power unseen commands them to this general assembly, directs them in their course, orders them to halt as occasion requires, and then to renew their flight till they arrive at the exact point of their destination?

'Who bids the Stork, Columbus-like, explore
Heavens not his own, and worlds unknown before?
Who calls the council, states the certain day?
Who forms the phalanx, and who points the way?'

'Where do the Cranes, or winding Swallows go,
Fearful of gathering winds and falling snow?
If into rocks or hollow creeks they creep,
In temporary death confined to sleep;
Or, conscious of the coming evil, fly
To milder regions and a southern sky?'

Birds in the torrid zone, were their nests otherwise situated, would be exposed to the assaults of the snake when he twines up the trunk, or the depredations of the ape; they suspend them at the point of a bough, or the extreme branches of the trees; and some, the Taylor-bird, not content with that precaution, attach their nests to the side of a leaf. The expertness of this little bird, at the profession from whence it derives its name, is admirable. When it has picked up a dead leaf, it *sews* it to the side of a living one, its slender bill being its needle, and its thread some fine fibres; the lining is composed of feathers, gossamer, and down. The Eagle constructs her habitation among inaccessible rocks, where it is shielded by projecting crags; and the Flamingo builds her nest in the middle of an extensive morass, beyond the reach of danger.

'From man retired, amid the lonely marsh,
Flamingoes build and tend their curious nest.'

What sagacity does the Vulture display as he sits silent and unseen in the American Forest, watching the operations of the monstrous Crocodile, while he deposits his eggs in the sand on the banks of the river? The little Butcher-bird, that attacks creatures four times bigger than himself, seizes its victims by the throat, and strangles them in an instant; and, as if conscious of its inability otherwise to separate the food it has so secured, contrives to spit it on a neighboring thorn, and then pulls it to pieces by its bill. The solitary Owl takes up its station in a corner of the barn at the approach of night, and with inflexible perserverance watches its prey. The Magpie is noted for its singular cunning. Bustards are said to keep a sentinel on the outlook to apprise them of danger. The Partridge acts with the greatest subtlety, in order to decoy away a dog or other animal when he approaches her nest; and the affection of the Hen for her tender brood is such, that for their protection she will attack the hog or the mastiff, and even not hesitate to fly at the fox. What animal evinces more courage than the cock, as he struts in sovereignty on his favorite dunghill? The facility with which Parrots are taught to speak and retain and repeat a number of words, is truly surprising. Cormorants in China are trained for the purposes of fishing; and Hawks, in other countries for fowling; and the Carrier Pigeon performs his lengthened embassy with unerring precision, and with an astonishing celerity. Thevenot says, they commonly travel from Aleppo to Alexandria in Syria in six hours, which is a distance of eighty-eight miles. The letters are generally fastened under their wings. In order to ascertain with some degree of accuracy the speed of these curious birds, a gentleman, some years ago, sent a carrier pigeon from London to a friend at Bury St. Edmunds, desiring it to be thrown up at a particular time two days after its arrival, this was attended to, and the pigeon returned to the Bull Inn, Bishopgate-street, two hours and a half afterwards, having in that time travelled seventy-two miles.—Even the stupid Ostrich, as it may be called in other respects, is not so destitute of natural affection and instinctive cunning as some are apt to imagine; for if she more frequently leaves her eggs than other birds, it is only in those hot climates where there is no necessity for constant incubation; and if she thrusts her head in the sand, when every chance of escape is at an end, it is no less certain that she contrives to prolong the chace and distance her pursuer, by occasionally lowering one of her wings, and disappointing him with a mouthful of feathers.

QUESTIONS ON LYCEUM No. 21.

How was Cicero treated after the battle of Pharsalia?

What domestic affair occurred in the family of Cicero, which remains as a blot upon his character?

In what way did he close his life?

What instances have we to show the power and triumph of science combined with the arts?

What invention, more than any other, has brought science to bear upon the arts, and into the common walks of life?

How many scribes would it require to write what is printed in the London 'Times'?

What invention has done much to advance navigation and commerce?

Which is most dangerous, travelling at the rate of thirty miles an hour on a rail-road, or ten miles an hour on a turnpike?

What is the most wonderful machine of modern times?

What calculations can be made by Babbage's machine?

What four movements are given in the Carstairian system of writing?

What constitutes the greatest beauty and power of science?

Which most often differ in the principles of moral science, the learned or ignorant? children or adults?

What method has the Lancaster Lyceum taken, to render their exercises interesting and profitable to the society and their schools?

When teachers and pupils are made members of Lyceums, do they ever fail of being interesting both to children and adults?

Where has a State Lyceum been recently organized?

What naturalists have given the fullest and most complete description of butterflies?

What are the changes to which this class of insects are subject?

By what process does chalk undergo a chemical decomposition? also mechanical?

If copper be dissolved in nitric acid, is a mechanical or chemical division effected?

What arts combine chemical and mechanical science?